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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/021,591	10/30/2001	Frode Larsen	60706-1150	3484

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EXAMINER

JAMAL, ALEXANDER

ART UNIT	PAPER NUMBER
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2643

DATE MAILED: 05/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/021,591

Applicant(s)

LARSEN, FRODE

Examiner

Alexander Jamal

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 October 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1-4,9-10,15-18,23** rejected under 35 U.S.C. 103(a) as being unpatentable over Dowling (6765967), and further in view of Thomas (3647992).

As per **claim 1**, Dowling discloses a transceiver performing echo cancellation.

The transceiver comprising a DSP (Fig. 2B) that receives and transmits information. The system further comprises AFE that comprises LPF 310,355, DAC 350, and ADC 315 (Fig. 3B) coupled to an echo canceller (which is implemented with a DSP). The system further comprises a line driver section 305 that comprises a transmit and a receive line driver. Line driver section 305 further comprises hybrid circuitry to separate/combine the transmit and receive signals. However, Dowling does not disclose that the DSP processes a 'transmit error signal' that is produced from the transmit line driver and processed by the DSP.

Thomas discloses an echo canceller for a system comprising an isolating (driving) amplifier 13. The analog values $x(t)$ (which are influenced (ie. produced) by the input impedance/configuration/non-linearity of amplifier 13) are fed into an adaptive circuit 24,27 (THOMAS: Fig. 1) as a 'transmit error signal' that is used to remove non-linear

transmit error from the received signal (via combining network 14) (THOMAS: Col 2 lines 20-65). Dowling discloses that the adaptive processor of the transceiver may be used to perform non-linear echo path modeling (DOWLING: Col 23 line 60 to Col 24 line 8). Additionally, Dowling teaches the use of ADC and DAC (DOWLING: Fig. 3B) as an AFE interface between the analog signaling and the digital processing. It would have been obvious to one of ordinary skill in the art at the time of this application that a transmit error signal, in combination with an additional ADC in the AFE (to convert the analog signal to digital) could be utilized in Dowling's system for the purpose of being able to compensate for echoes caused by non-linear distortions.

As per **claims 9,15**, claims rejected for same reasons as claim 1 rejection.

As per **claim 23**, claim rejected as a method performed by the system of the claim 9 rejection.

As per **claim 2**, Thomas discloses that the transmit error signal ($x(t)$) is modified to error compensate the received signal via combining network 14 (Fig. 1). Dowling discloses the use of a DSP (as mentioned above).

As per **claim 3**, in both Dowling and Thomas' systems, the echo canceller is used to remove a transmit signal component (echo) from the receive signal.

As per **claims 4,18**, Dowling discloses (Fig. 3B) DAC 350, ADC 315, LPF 310, and LPF 355. Dowling in view of Thomas discloses an additional ADC that is obvious as specified in the claim 1 rejection.

As per **claims 10,17**, Thomas discloses a combining network 14 to subtract the modified transmit error signal from the receive signal.

As per **claim 16**, Dowling discloses a hybrid (the transformer) as part of line driving stage 305 in Fig. 3B.

3. **Claims 5-8,11-14,19-22,24,25** rejected under 35 U.S.C. 103(a) as being unpatentable over Dowling (6765967) and Thomas (3647992) as applied to claims 1,9,15,23 and further in view of Mukherjee (6226322).

As per **claims 5,11,19,24**, Dowling and Thomas disclose applicant's claims 1,9,15,23 but they do not specify what type of transmit amplifier is used in the line driver.

Mukherjee discloses a transceiver comprising transmit and receive line drivers that comprise amplifiers. Mukherjee discloses an inverting receive amplifier (Fig. 7,8), and further discloses that the receive amplifier, along with any of the other amplifiers mentioned (including the transmit line driver) could be implemented differentially. The amplifier shown in Fig. 8, when implemented differentially, comprises a virtual ground (due to the negative feedback) that is coupled to either the transmit or receive line. When implemented differentially, the signal input to the adaptive processing of Thomas' system is taken from the virtual ground (via any input impedance/resistors). It would have been obvious to one of ordinary skill in the art at the time of this application that the line drivers in Dowling's system could be implemented differentially for the advantage of the common mode rejection that is inherent to differential signaling.

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As per **claims 6,7,12,13,20,21**, claims rejected for the same reasons as claim 5 rejection.

As per **claims 8,14,22,25**, because the transmit error signal is read (via input resistors) from the virtual ground, the transmit error signal contains non-linear error of the transmit signal.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander Jamal whose telephone number is 571-272-7498. The examiner can normally be reached on M-F 9AM-6PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curtis A Kuntz can be reached on 571-272-7499. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9315 for After Final communications.

AJ
April 26, 2005


CURTIS KUNTZ
SUPERVISORY PATENT EXAMINER
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